

gas generators for gas engines; new types of gas engines; a new method of heating boilers; new methods of spinning, weaving, and dyeing textile fabrics; a simple cut-out for electrical installations.

The following subjects in natural history and agriculture will be awarded medals:—a geological or mineralogical description of part of Alsace; a detailed catalogue of plants in the neighbourhood of Mulhouse, Thann, Altkirch, and Guebwiller; a treatise on the fauna of Alsace; a treatise on the plants and insects inimical to agriculture in Alsace and the methods of destroying them.

In commerce and statistics the prize subjects are:—a study of methods of insurance against risks of transport; a treatise on insurance against fire, with especial reference to the factories of Alsace; a memoir on the variation in the price of coal in Alsace during the last thirty years; a study of the effect of taxation on industrial development.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The Vice-Chancellor has announced to the Senate the munificent gift of 1750*l.*, made by Dr. Ludwig Mond towards the fund for increasing the stipends of the Stokes and Cayley university lecturers in mathematics.

The detailed proposals put for the diploma in forestry were to be discussed on Thursday last. Apparently they satisfied the members of the university, for there was no criticism made on them.

The degree of Master of Arts, *honoris causa*, is to be conferred upon Mr. R. I. Lynch, curator of the botanic garden. Mr. Lynch is well known as a writer on horticultural subjects.

On the nomination of the board of geographical studies, Dr. Guillemard and Sir G. D. T. Goldie, K.C.M.G., F.R.S., and on the nomination of the council of the Royal Geographical Society, Sir Clements R. Markham, K.C.B., F.R.S., and Dr. J. Scott Keltie, have been appointed members of the board of geographical studies for the year beginning January 1, 1906.

Mr. J. B. Peace has been appointed chairman of the examiners for the mechanical sciences tripos, 1906.

The general board of studies has approved Mr. H. J. H. Fenton of Christ's College, for the degree of Doctor in Science.

The following notice of the next award of the Walsingham medal has been issued:—The medal is to be awarded for a monograph or essay giving evidence of original research on any botanical, geological, or zoological subject. The competition is open to graduates of the university who at the time fixed for sending in the essays are under the standing of Master of Arts. The essays for the ensuing year are to be sent to the chairman of the special board for biology and geology (Prof. Langley, The Museums) not later than October 10, 1906.

The special board for biology and geology give notice that the Gedge prize will be offered for competition in the Michaelmas term, 1906. The prize will be awarded for the best original observations in physiology, but a candidate who has received a certificate of research from the university will not be entitled to submit an essay which is substantially the same as the dissertation for which such certificate of research was granted. Candidates need not necessarily be graduates of the university. Essays are to be sent to the professor of physiology not later than October 1, 1906.

DR. A. J. EWART, special lecturer in vegetable physiology, Birmingham University, has been appointed professor of botany in the University of Melbourne in succession to the late Baron von Müller.

THE will of the late Mr. John Edward Taylor, part proprietor and a former editor of the *Manchester Guardian*, on which probate was granted in London on December 9, among numerous bequests, leaves, on the decease of the widow, 20,000*l.* to the Victoria University of Manchester.

At a meeting of the council of the University of Birmingham held on December 6, the Chancellor announced that the family of the late Mr. Harding had

offered 10,000*l.* to the Birmingham University for the erection of a library. The offer has been gratefully accepted by the council.

On Tuesday, December 5, Sir W. Martin Conway distributed the prizes and certificates gained by the students at the Sir John Cass Technical Institute during the past session. Sir Owen Roberts, chairman of the governing body, presided. Mr. George Baker stated that the scope of the work of the institute and the number of students continued to progress steadily, and that a large proportion were studying subjects bearing directly upon the industries in which they were engaged. Sir Martin Conway, in the course of his address, pointed out that people in this country suffer from a confusion of ideas in respect to education, and that they do not believe sufficiently in the necessity of giving the highest possible education to the directing brains of industries, nor do they understand sufficiently the length of time and the experience that are required for skilful hands to receive their full equipment. He remarked that the real struggle with Germany in manufactures is due to the enormous number of highly educated men turned out at the German universities; it is not a question of technical education, but of scientific education. The German is not a whit more scientific or better than the Briton, but faith in science which exists in Germany is lacking in England, and this gives the Teutonic tortoise the advantage over the British hare.

THE following bequests and gifts for higher education in the United States are announced in *Science*. By the will of the late Mr. Stephen Salisbury, the Worcester Polytechnic Institute receives a bequest of 40,000*l.* This money comes without restrictions of any kind on the part of the testator. In addition to this bequest, Mr. Salisbury, at the time of his resignation a few weeks ago from the presidency of the board of trustees, made an additional gift to the institute of 20,000*l.*, to be paid immediately. Formal announcement of the 50,000*l.* legacy to the Sheffield Scientific School from the estate of the late Mr. M. D. Viets has been made by Prof. Russell H. Chittenden, director of the school. The bequest will be used for the physical, mathematical, and general scientific needs of the school. The late Mr. Frank Harvey Cilley, the engineer, has bequeathed the residue of his estate, which will probably amount to 14,000*l.*, to the Massachusetts Institute of Technology. Mr. T. P. Shonts, chairman of the Isthmian Canal Commission, has given to Monmouth College 2000*l.* as part of the 6000*l.* needed to obtain an additional 6000*l.* which Mr. Andrew Carnegie had promised to give the college for a library. The late Mr. Stephen Salisbury, of Worcester, Mass., has bequeathed 40,000*l.* to the Worcester Polytechnic Institute, 50,000*l.* to the American Antiquarian Society, and 1000*l.* and a site for a building for the Worcester Natural History Society.

PROF. W. J. ASHLEY, dean of the faculty of commerce in the University of Birmingham, distributed on December 6 the prizes gained by candidates at the examinations of the London Chamber of Commerce. During the course of a subsequent address, Prof. Ashley remarked that the science of commerce has yet to be made, but, in his opinion, a true science of commerce is capable of being created. At present, however, it does not exist. Its formulation should have been the task of the political economists; but hitherto English economists have been too content to pursue the results, the conclusions to be reached by a process of reasoning starting with certain assumptions. It is necessary that the problems which actually present themselves to a business man in the course of his operations should be realised and studied, and that the various ways in which they have been approached and faced ought to be brought together, grouped, criticised, and analysed. The function of the economist is not to arrive at general abstract conclusions and then look round in the world of business for examples or illustrations of the conclusions arrived at. He should condescend to a more concrete and a more patient survey of the actual facts of real life. Prof. Ashley considers it to be vitally important that the highest type of education shall be brought into close touch with the realities of economic life. If that is properly done it will not degrade education, but vivify it.

THE current number of the *Monthly Review* contains an article on public school education by Mr. A. C. Benson, in which some valuable testimony as to the inadequacy as a training for life of a purely classical education is given. The question as to what are the intellectual accomplishments of a boy of average intelligence who has been through a public school and a university is answered in the following words:—"He knows a very little Latin and Greek, and he endeavours to put them out of his mind as fast as he can; he knows a little science; perhaps a little history, mostly ancient. He cannot generally calculate correctly in arithmetic; he knows no modern languages to speak of; he cannot express himself in simple English, and his handwriting is often useless for commercial purposes." And later, we read, "he has learnt to think the processes of the mind dreary and unprofitable, to despise knowledge, to think intellectual things priggish and tiresome." Mr. Benson summarises his contentions in the following words:—"believing intensely, as I do, in the possibilities of intellectual education, I have tried to judge the classical system as fairly as I can by results, and I see that those results are in many cases so unsatisfactory and so negative that experiments are urgently needed. Simplification seems to me to be the one essential thing." If a writer who was formerly a master at our greatest public school finds it necessary to write in this plain manner, it is evidently high time that scientific methods were applied to obtain an answer to the question, what constitutes a suitable public school education, and how can it be secured?

A LARGE audience assembled at the Borough Polytechnic Institute on Monday evening, December 4, on the occasion of the thirteenth annual meeting and distribution of prizes and certificates. The chairman, Mr. Leonard Spicer, said the work of the institute was going forward with great strides, and he feared that, even allowing for the additions to the building which had recently been made, the governors would again be faced with the problem of knowing how to house the students. Although the word "polytechnic" is still associated in many minds with recreation and amusements, the chief work of institutes of this kind lies in an educational and technical direction, 15,000*l.* a year being the least sum upon which the work at the Borough can be carried on at present. Mr. C. T. Millis, the principal, read the annual report, which disclosed a very satisfactory state of progress of the institute. An experiment is being made in the direction of coordination with London County Council evening schools, and several new classes have been started. A satisfactory feature of the work of the institute is the readiness with which intending students ask for and follow advice given as to their courses of study, and the increasing number of students who attend for two, three, and four years. After the certificates, which numbered considerably more than five hundred, and the numerous prizes were distributed by Lady Lockyer, Sir Norman Lockyer, K.C.B., delivered an address. In a few remarks, Prof. Perry claimed for the polytechnic institutions of London that they were doing a work that was unprecedented, and which our colonies are now endeavouring to imitate. He had recently returned from South Africa, where he found the people following the lead which London was now giving in the matter of technical education. Votes of thanks were proposed and seconded by Sir Philip Magnus and Mr. W. F. Sheppard.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, November 16.—"The Electrical Conductivity of Dilute Solutions of Sulphuric Acid." By W. C. D. **Whetham**, F.R.S.

The equivalent conductivity of neutral salts when dissolved in water approaches a limiting value as the dilution is increased; with solutions of acids and alkalies, however, the equivalent conductivity reaches a maximum, and then falls rapidly as the dilution is pushed farther.

It has been supposed that this diminution of equivalent conductivity at extreme dilutions is due to interaction between the solute and the impurities which remain even in re-distilled water.

Kohlrausch has given evidence to show that the chief

impurity in water carefully re-distilled is carbonic acid, and Goodwin and Haskell conclude that the diminution of equivalent conductivity of dilute acids is due to the presence of carbon dioxide.

In order to examine the real effect of carbonic acid and other impurities on the conductivity of an acid solution, the writer and his wife have carried out an investigation in which the amount of impurity was varied, and the result observed. The conductivity of dilute solutions of sulphuric acid and its variation with concentration was determined in four solvents:—(1) good quality re-distilled water; (2) the same water to which a trace of carbon dioxide had been added; (3) the same water with a trace of potassium chloride; (4) the same water which had been freed as far as possible from carbonic acid and other volatile impurities by repeated boiling under diminished pressure.

In each case the conductivity of the solvent was subtracted from that of the solution. The results may be summarised as follows:—

Within the limits of experimental error, the equivalent conductivity of a dilute acid is not affected by boiling the water under diminished pressure, though the conductivity of the solvent is thereby much diminished. The equivalent conductivity of the acid is also unaffected by the addition of a small quantity of potassium chloride to the water, though the conductivity of the solvent is thereby much increased. But, by the addition of a little carbonic acid, the equivalent conductivity of the sulphuric acid is diminished appreciably. It is natural to conclude that, while the presence of carbonic acid would produce a diminution of equivalent conductivity of the same character as that observed it does not explain the total effect.

"The Accurate Measurement of Ionic Velocities." By Dr. R. B. **Denison** and Dr. B. D. **Steele**. Communicated by Sir William Ramsay, K.C.B., F.R.S.

The authors have succeeded in devising an apparatus with which it is possible to compare and measure the velocities of the ions of a given salt without using gelatin or other membrane during the actual experiment. This enables the method of direct measurement of ionic velocities to be extended to dilute solutions, and the results obtained are free from any error due to electric endosmose.

The transport number and the average absolute velocity of the ions of a number of salts have been measured at dilutions down to one-fiftieth normal, and at two temperatures, 18° C. and 25° C. It is easy to measure by this method the transport number of the ions of some salts which present great difficulty by the analytical method of Hittorf, e.g. KClO_3 , KClO_4 , KBrO_3 . The following are some of the numbers obtained for the anion transport number:— $\text{KCl } n/10$, 0.508; $\text{NaCl } n/10$, 0.618; $\text{KCl } n/50$, 0.507; $\text{CaCl}_2 n/50$, 0.587. The corresponding numbers determined by the analytical method are 0.508, 0.617, 0.507, 0.59.

The values obtained by the authors for the average velocity of the ions in cm./sec. agree in a remarkable manner with those calculated by Kohlrausch from conductivity data, and form a striking confirmation of the ionic theory of solutions. The values of the ionic velocity of the potassium ion in KCl , KBr , and KI are, for example, found to be:—at $n/10$, 0.000563, 0.000562, 0.000564 cm./sec.; at $n/50$, 0.000606, 0.000598, 0.000599 cm./sec. at 18° C.

It is claimed that the method is at least as accurate as that of Hittorf, and an experiment can be performed in about one-tenth of the time. It also gives a means of comparing the degree of dissociation of salts containing a common ion.

Mineralogical Society, November 14—Prof. H. A. **Miers**, F.R.S., president, in the chair.—The determination of the angle between the optic axes of a crystal in parallel polarised light: Dr. J. W. **Evans**. The crystal plate is rotated on the optic normal as axis, and the positions are determined in which the relative retardation is nil. This may be observed by using a gypsum plate or the double quartz wedge devised by the author. In the latter case the positions in question are marked by the coincidence of the bands in the two halves of the wedge. This gives a very exact reading if strictly parallel light be employed.—Mineralogical notes (diopside and albite): Prof. W. J. **Lewis**. A large tabular crystal of white diopside, a brown